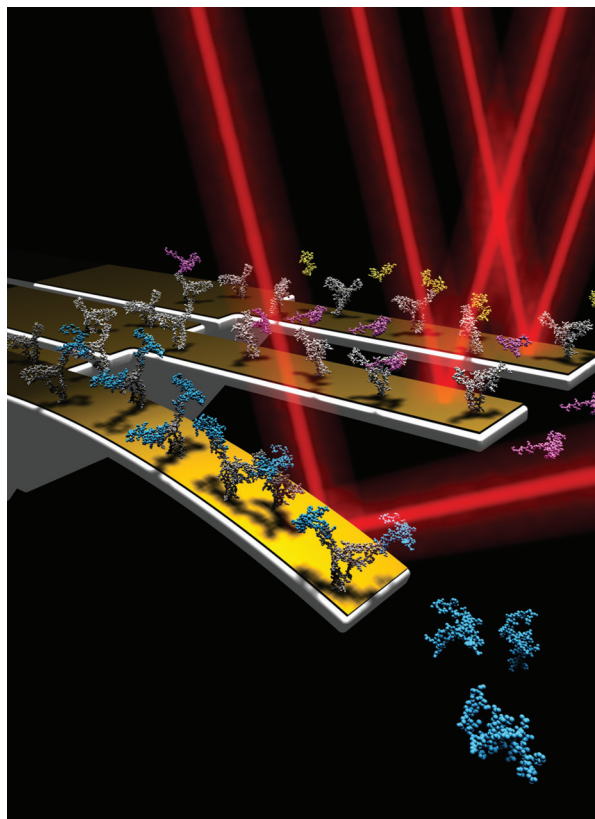


Investment Mode 2: NNI Grand Challenge Areas

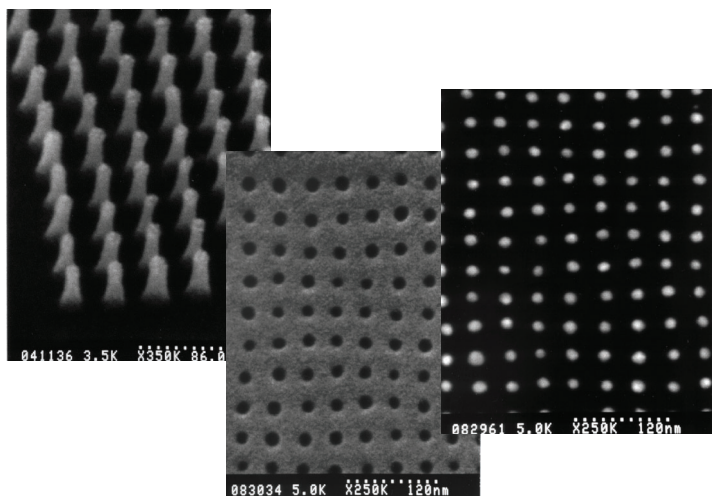
This section provides an overview of the nine grand challenge areas. Each overview covers the specific challenge area, a vision of how nanotechnology can drive progress in that area, the participating agencies, and an example demonstrating the progress that has been made to date.

The grand challenge areas are presented in the following order:

- Nanostructured Materials by Design
- Manufacturing at the Nanoscale
- Chemical-Biological-Radiological-Explosive Detection and Protection
- Nanoscale Instrumentation and Metrology
- Nano-Electronics, -Photonics, and -Magnetics
- Healthcare, Therapeutics, and Diagnostics
- Energy Conversion and Storage
- Microcraft and Robotics
- Nanoscale Processes for Environmental Improvement



(Above) Silicon cantilevers with chemically or biologically selective coatings for a biochemo-opto-mechanical chip. Adsorption of the target molecules on the coatings produces an expansion of the coating, resulting in deflection of the cantilever. Cantilever deflection can be sensed via light deflection as shown in the figure or by diffraction of light from interdigital fingers formed on the cantilever. This device provides the potential for rapid, sensitive, cost-effective detection of biomolecules and chemical species (courtesy A. Majumdar, University of California, Berkeley, and Lawrence Berkeley National Laboratory).



(Far left) Imprint mold with 10 nm diameter pillars. (Left center) 10 nm diameter holes imprinted in a polymer substrate. (Near left) 10 nm metal dots fabricated using a template such as in the center picture (courtesy S. Chou, Princeton University).